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Review Article

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Contemporary Review of Buried Penis Repair

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Abstract

Various strategies have been developed for the surgical management of buried penis, including enhancing penile exposure and altering skin coverage. Each study has described a new surgical approach and presented a favorable outcome. This review analyzed the most recent relevant work, focusing attention on the common principles of surgical techniques and comparing their results. We found that most surgical techniques followed the same principles, such as complete degloving of the penile shaft and penile base fixation. However, controversies remain regarding classification and terminology of buried penis. Adequate surgical management requires comprehension of its various causes. Therefore, understanding the essential causes of each case and following the appropriate techniques are essential for ensuring favorable surgical outcomes.

Keywords

Buried penis; Lymphedema; Trapped penis

Introduction

Buried penis is an uncommon disorder that causes recurrent balanitis, voiding problems, and social embarrassment among peers [1]. Furthermore, in clinical practice, most patients are referred for cosmetic correction of this problem. Although numerous techniques have been reported, no consensus has been reached regarding the optimal method to follow. Unsuccessful surgeries may cause post-operative complications including recurrent retraction, excessive preputial redundancy with the necessity of further surgery, multiple penile skin scars, and persistent lymphedema [2]. The choice of an appropriate surgical procedure is therefore critical. In this review, we analyzed the anatomical etiology, methods of correction, and treatment outcomes for this disorder.

Etiology and Classification

Early descriptions of buried penis were provided by Keyes in 1919 [3]. Since then, numerous terms have been used to describe an inconspicuous phallus, including concealed penis, hidden penis, trapped penis, webbed penis, and congenital mega-prepuce. Crawford and Maizels et al. proposed two different classifications based on abnormal penile skin attachments and excessive suprapubic fat [3,4]. However, the literature has not adopted a uniform classification system.

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Clinically, physical examination should enable the differentiation of truly congenital buried penis from a concealed penis resulting from obesity [5]. In cases of concealed penis resulting from obesity, the penis is normally "extruded" when suprapubic fat is depressed, indicating that the proximal shaft skin is fixed at the base of the penis. This is considerably different from cases of buried penis, in which pushing on the suprapubic fat only tightens the deficient penile shaft skin. After a review of the recent literature, a simple and practical classification for buried penis was developed in this study, as follows: Type 1: congenital buried penis (with mega-prepuce or without mega-prepuce); Type 2: buried penis caused by scarring form previous surgery; Type3: buried penis resulting from excessive obesity (interchangeable with concealed penis).

Various congenital defects of buried penis have been reported, including deficient penile skin, laxity of attachment, a tethering effect by dysgenetic dartos fascia, and excessive suprapubic fat [2,6]. However, more precise descriptions related to etiology should be clarified to ensure the development of optimal surgical procedures. After referring to the contemporary literature, we suggested five etiological factors for congenital buried penis in non-obese patients: (1) severely preputial phimotic ring; (2) paucity of outer prepuce; (3) excessively long inner prepuce; (4) deficient proximal fascia attachments; (5) excessive attachments of fascia to the dorsal cavernosum.

Buried penis usually presents in two age groups, with peaking in infancy and adolescence. Indications for surgical repair vary. In childhood, patients may present with ballooning urination and post-voiding dripping. Other patients suffer from chronic balanitis as a result of poor hygiene. In adolescence, patients may present with difficulty in holding the penis and controlling the spray of urine. Clinically, the main concern in children with buried penis is parental anxiety regarding cosmetic aspects. We conclude that surgery should be encouraged if concealment contributes to balanoposthitis, poor hygiene, and social embarrassment.

Surgical Management

Numerous surgical techniques for buried penis have been reported in the past two decades. Surgical variations can often be attributed to the presumed causes of the defects of individual patients and attempts to simplify the treatment approach. Surgeons should be familiar with several different techniques for release, fixation, and skin advancement. We selectively reviewed the literatures that collected cases over 20 from the past 20 years [7-24]. As a result, 18 papers were recruited to analyze the surgical procedures. In general, the published techniques are based on four principles: complete degloving of penile shaft skin, fixation sutures between the skin dermis and Buck's fascia at the penile base, trimming the redundant prepuce, and redistribution and covering of the penile skin.

Incision of a tight phimotic ring to expose the glans is the crucial first step in this surgery. In our review, half of the studies adopted combined ventral incision and circumferential incision to unfurl the preputial skin as the first step in their methods. Furthermore, circumferential incision and degloving of the preputial skin were used in 14 of the analyzed studies (Table 1). However, three of the

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studies described only penile base incision for fixation sutures and indicated no need for circumferential incision [8,19,21]. A total of 16 of the studies emphasized the importance of fixation sutures between Buck's fascia and penile base skin for successful repair (Table 1). Our review indicated that most authors emphasized the complete degloving of the penile shaft and fixation sutures as the key aspects of successful buried penis repair.

On the basis of our surgical experience with buried penis repair, we proposed that the management of a severe phimotic ring and deficient outer penile skin is more critical than deficient fascia attachments. Other authors have also considered a paucity of penile shaft skin to be the main underlying defect in this condition [6,17]. We suggest that the longer inner skin can compensate for the shortage of outer skin. In our previous study, we used one preputial flap to correct the deficient outer skin [22]. However, a complicated and unnatural suture line resulted in multiple scarring. Recently, we adopted and modified another technique described by Sugita [20]. These technical modifications to the correction of buried penis included a long ventral slit on the outer prepuce and a short dorsal slit on the inner prepuce, connecting incision between two slits, primary repair after trimming the inner prepuce, and penile base fixation sutures in two corners (Figure 1). The advantages of the new techniques are their relative simplicity, decreased possibility of skin necrosis, and avoidance of the need to transpose local preputial flaps.

Table 1: Overview of recent literature about buried penis repair.

Year	Author	Case No	Fixation	Degloving	Circum in	Ventral in	Base in	Success	Complic
1995	Lim [7]	36	Yes	Yes	Yes	Yes	--	94%	6%
1995	Joseph [8]	22	Yes	--	--	--	Yes	91%	9%
1998	Cromie [1]	74	Yes	Yes	Yes	Yes	--	100%	0%
1999	Casale [9]	43	Yes	Yes	Yes	--	--	98%	2%
2001	Chuang [10]	62	Yes	Yes	Yes	--	--	87%	13%
2001	Brisson [11]	50	Yes	Yes	Yes	--	--	94%	6%
2002	Radhakrishnan [12]	49	Yes	Yes	Yes	Yes	--	96%	4%
2004	Frenkl [14]	79	Yes	Yes	Yes	--	--	88.5%	11.5%
2005	Lee [15]	21	Yes	Yes	Yes	--	--	90%	10%
2005	Redman [17]	31	--	--	Yes	--	--	100%	0%
2007	Abbas [18]	30	Yes	Yes	Yes	Yes	--	87%	13.3%
2007	Borsellino [19]	56	Yes	Yes	Yes	--	Yes	95%	5%
2009	Sugita [20]	57	--	--	Yes	Yes	--	92%	8%
2010	Yu [21]	62	Yes	--	--	--	Yes	93.5%	0%
2010	Wang [22]	20	Yes	Yes	Yes	Yes	--	100%	0%
2013	Spinoit [23]	47	Yes	Yes	Yes	Yes	--	91%	7%
2014	Hadidi [6]	61	Yes	Yes	Yes	Yes	--	91%	9%
2016	Liu [24]	153	Yes	Yes	Yes	Yes	--	98.7%	1.3%

Note: No: Number, Circum: Circumferential, in: incision, Complic: Complication

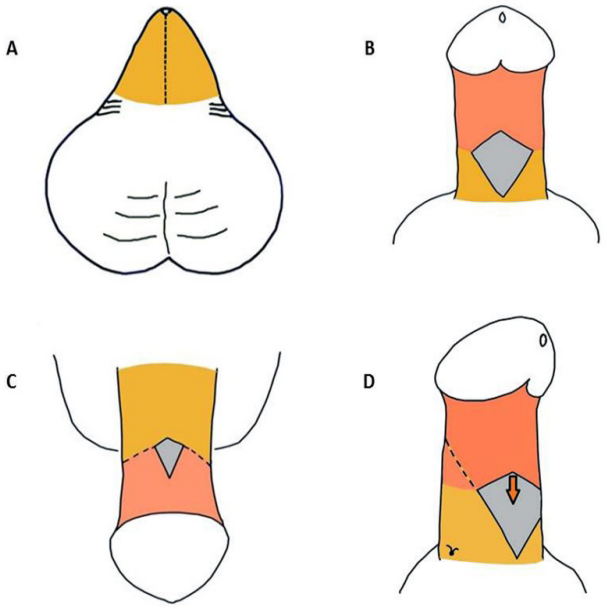

Figure 1: Diagrams of buried penis repair. (A) long ventral slit on the outer prepuce. (B) diamond-shaped defect in outer prepuce. (C) short dorsal slit on the inner prepuce. (D) connecting incision between two slits, and penile base fixation sutures in two corners.

In general, the modified techniques for buried penis repair are easier than the procedure we used in our 2010 study.

Outcomes and results

According to our review, short-term outcomes are generally excellent, with satisfactory results in 87% to 100% of cases (Table 1). However, the inclusion of trapped penis or concealed penis caused by obesity would lead to different analytical results. Therefore, we focused on the outcomes of patients with congenital true buried penis. Two studies have reported long-tern outcomes with follow –up durations of more than 5 years [13,18]. Cromie et al. reported that no long-term complications were observed, in addition to positive short-term results [1]. Herndon et al. concluded that buried penis repair was generally successful in toddlers and less likely to be successful in adolescents [13].

Complications were usually minimal in all 18 studies we analyzed. The incidence of recurrent retraction necessitating secondary surgery has been reported as 0% to 13.3% (Table 1). Ventral lymphedema has been reported to occur in 1% to 11% of cases [20]. Most cases resolved spontaneously in 2 weeks, but further surgery had been required in a few cases because of persistent symptoms. Post-operative bulky penis with excess redundant prepuce has also been reported in some of these studies. Long ventral incision and trimming the excessive inner prepuce are key steps for preventing bothersome redundancy and lymphedema.

Conclusions

In this review, we focused on surgical treatment for congenital true buried penis. Initial ventral and circumferential incisions were found to be critical steps for achieving successful release of the penile shaft. Fixation sutures between Buck's fascia and the penile base were key points for ensuring early post-operative successful cosmetic results. Trimming of the inner prepuce prevented excessive preputial redundancy. Adolescents presenting with concealed penis and excessive suprapubic fat have different concerns, and these cases therefore should not be only corrected using these principles. When treating patients with buried penis caused by previous surgery (trapped penis) or excessive obesity, we should adopt techniques involving skin advancement, skin graft, and liposuction. Although most complications are temporary, surgeons should remember that the parents of patients are often attentive to cosmetic concerns.

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